

**Operation and Maintenance Plan
for the Central Facilities Area
Landfills I, II, and III
Native Soil Cover Project
Operable Unit 4-12**



Idaho National Engineering Laboratory

U.S. Department of Energy • Idaho Operations Office



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Central Facilities Area Landfills I, II, and III
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CONTENTS

1.	INTRODUCTION	1
1.1	Vegetative Cover	1
1.2	Soil Cover	1
1.3	Rock Armor	1
1.4	Neutron Probe Access Tubes	2
1.5	Time Domain Reflectometer	2
1.6	Institutional Controls	2
2.	VEGETATIVE COVER	2
3.	SOIL COVER	3
4.	ROCK ARMOR	4
5.	NEUTRON ACCESS PROBES TUBES	4
6.	TIME DOMAIN REFLECTOMETER	4
7.	INSTITUTIONAL CONTROLS	4
8.	ORGANIZATION AND RESPONSIBILITIES	5
8.1	Organization	5
8.1.1	Department of Energy Project Manager	5
8.1.2	INEEL Management and Operating Contractor WAG 4 Remediation Project Manager	5
8.2	Responsibilities	5
8.2.1	Inspections	5
8.2.2	Repair/Replacement of Material	5
8.2.3	Reporting	5
9.	REPORTING REQUIREMENTS	6
9.1	Inspection	6
9.2	Maintenance	6
9.3	Reporting	6

ACRONYMS

CFA	Central Facilities Area
DOE-ID	U.S. Department of Energy, Idaho Operations Office
INEEL	Idaho National Engineering and Environmental Laboratory
M&O	Management and Operating
NPAT	neutron probe access tubes
O&M	Operation & Maintenance
RD/RA	Remedial Design/Remedial Action
TDR	time domain reflectometer
WAG	waste area group
WP	Work Plan

Operation and Maintenance Plan for the Central Facilities Area Landfills I, II, and III Native Soil Cover Project Operable Unit 4-12

1. INTRODUCTION

This site-specific Operation and Maintenance (O&M) Plan describes the activities and procedures required to maintain the Central Facilities Area (CFA) Landfills I, II, and III natural soil covers and their related systems and equipment. Basic elements of the O&M Plan include a description of inspection, maintenance, and repair procedures for the vegetative cover, soil cover, rock armor, and monitoring equipment. Operation and sampling procedure for neutron probe access tubes (NPATs) and time domain reflectometers (TDRs) are covered in the Post Closure Monitoring Work Plan (Appendix A of Remedial Design/Remedial Action [RD/RA]).

Items that are address in this O&M Plan are discussed in the sections below.

1.1 Vegetative Cover

Inspection and corrective maintenance of the vegetative cover including:

- Inspections for nongrowth areas, sparse growth areas, and weed and shrub encroachment
- Corrective repair.

1.2 Soil Cover

Inspection and corrective maintenance of the soil cover including:

- Inspections of erosion areas and ponding caused by subsidence
- Inspections for animal intrusion
- Surveying for slope movement and changes in contours
- Corrective repair of erosion, animal intrusion, and ponding areas.

1.3 Rock Armor

Inspection and corrective maintenance of the rock armoring including:

- Inspections of rock-armored slopes

- Corrective repair.

1.4 Neutron Probe Access Tubes

Inspection and corrective maintenance of NPAT installations including:

- Inspections of well components
- Inspections of NPAT
- Corrective repair of problem areas.

1.5 Time Domain Reflectometer

Inspection and corrective maintenance of the TDR installations including:

- Inspection of TDR components
- Corrective repair of problem areas.

1.6 Institutional Controls

Inspection of institutional controls including:

- Fences and postings restricting access to the CFA Landfill area by unauthorized personnel.

2. VEGETATIVE COVER

Vegetation will be monitored the first 3 years following seeding and again prior to the 5 year review to ensure proper growth. Success of revegetation shall be determined by comparing seeded areas with undisturbed areas in the vicinity of the landfills, while factoring in the length of time since seeding. Areas experiencing seeding failure, as evidenced by lack of perennial grass establishment, invasion by weeds (primarily Russian thistle, wheatgrass, and tumble mustard), or encroachment of shrubs (sagebrush and rabbitbrush), will be documented and photographed. Any area larger than 3 × 3 m (10 × 10 ft) which exhibits seeding failure will be reseeded and fertilized in accordance with the requirements of Specification Section 02930 (Appendix D of the RD/RA WP). At the remediation project manager's direction, encroaching shrubs or weeds will be removed at ground level. The reseeded areas will require follow-up inspections to ensure successful reseeding. A site inspection photo log for CFA Landfills I, II, III will be used for recording the photographs.

The monitoring frequency of the vegetative cover will be evaluated during the 5 year review.

3. SOIL COVER

The soil cover will be inspected quarterly for the first year and semi-annually thereafter until the 5 year review with particular attention being paid to those areas where the vegetative cover has degraded. Contingency inspections will also be conducted as needed after severe rainstorms, floods, tornadoes, earthquakes, or vandalism. Visual inspection will identify areas on the slope affected by erosion and/or subsidence. Areas of the landfill covers which exhibit: (1) erosion rills in excess of 5 cm (2 in.) in depth or 15 cm (6 in.) in width, for a distance of over 3 m (10 ft)¹, (2) areas of the covers showing signs of ponding or localized subsidence in excess of 15 cm (6 in.)², and (3) all animal intrusions into the top of the cover away from the side slopes will be documented, photographed, and repaired with additional soil to return them to the required grade and then be reseeded, in accordance with Specification Sections 02200 and 02930 (Appendix D of the RD/RA WP). Follow-up inspections, including photographs if possible, shall be conducted after any repair or maintenance activity.

A topographic survey of the cover will be conducted annually for years 1, 2, and 3 and then in year 5 for the 5 year review (concurrently with the annual vegetation inspection) to check for movement of slopes and general cover subsidence. If erosion or subsidence occurs, the periodicity of inspections will be based on agency consensus.

Topographic survey accuracy shall be in accordance with Specification 02210, found in Appendix D of the RD/RA WP. The initial topographic survey will establish a 30.5- x 30.5 m (100- x 100-ft) grid across each landfill to allow the same locations to be appraised for comparison of elevation, benchmarks placed around the landfill perimeters will be applied to subsequent surveys. Area of concern will be documented so that ensuing inspections can detect continued movement or subsidence. Should continual movement or subsidence over a period of 3 years indicate failure, the slopes will be evaluated to determine the cause of movement. Evaluation of cover failure will consist of:

- Determining the type of slope failure which occurred (circular slope failure, subsidence, block/sliding failure) based on a visual inspection of the area by a qualified engineer
- Determining the cause of the failure.

¹ Discussion on justification for 2-in. depth and 6-in. width limitation on erosion channeling. Most reference values for acceptable erosion rates are based on x-amount of ton/acre/year. The EPA's Technical Guidance Document, *Final Covers on hazardous Waste Landfills and surface Impoundments* (EPA/530/SW-89-047, July 1989) states that the maximum allowable erosion rate for top soil layers should be less than 2 ton/acre/year. Since the calculations for the CFA Landfills indicate that erosion rates are less than 2 ton/acre/year another criteria was established to evaluate the integrity of the surface soil layer. This criteria involved establishing a maximum rill and rut size of 2-in. deep and 6-in. wide. This criteria was based on engineering judgment and not on any specific guidance documents. Since the surface topsoil layer is a minimum of 6-in. thick, it was determined that a maximum of 2-in. of depth of erosion would be allowed for channeling. This would allow a certain safety factor prior to the topsoil layer being breached. The 6-in. wide criteria was based on the assumption that beyond 6-in. it would become more difficult to determine the actual depth of the channel and the true extent of the erosion.

² Discussion on justification for a 6-inch subsidence of the covers. Subsidence, or better described as differential settlement, can damage the cover systems by developing tensile strains in the cover soil materials. These tensile strains can lead to cracks within the cover. Gilbert and Murphy (1987) discuss that most clayey soils can withstand maximum tensile strains of 0.1 to 1%. A tensile strain of 0.1 corresponds to a distortion (δ/L) of approximately 0.05. If we assume that most depression will be a minimum of 20 ft in diameter, the allowable δ (depression depth) corresponding to a length (L) equal to 10 ft and a distortion of 0.05 equals 6 in. Therefore, the maximum allowable depression should be 6 in.

REFERENCE: Gilbert, P.A. and W.L. Murphy, 1987. Prediction mitigation of subsidence damage to hazardous waste landfill covers. EPA/600/2-87/025 (PB87-175386). Cincinnati, Ohio, U.S. EPA

The nature and extent of repairs would be determined by the Idaho National Engineering and Environmental Laboratory (INEEL) Management and Operating (M&O) Contractor CFA Landfill Remediation Project Manager and the agencies.

4. ROCK ARMOR

The rock armoring on the north end of Landfill II will be inspected semi-annually to ensure there are no signs of subsidence or erosion. Where rock has eroded (identified as erosion rills or rock movement) or where rock surface has settled 30 cm (12 in.) in depth below the design grade, the underlying soil will be repaired to meet the thickness and gradation requirements of Specification Section 02200 and satisfy the grade requirements of design drawings and technical specifications, found in Appendix C.

Subsidence in excess of 30 cm (12 in.) will be identified during the 9- x 9-m (30- x 30-ft) topographic survey or during semi-annual inspections. The rock armor will be repaired to meet the thickness and gradation requirements of Specification Section 02200 found in Appendix D of the RD/RA WP and the grade requirements of civil drawings found in Appendix C of the RD/RA WP.

In the event that subsidence or erosion of underlying soil displaces the rock armoring, the rock will be removed, additional soil will be placed on the slope, and the rock will be replaced, in accordance with the requirements of Specification Section 02210 and 02200 (Appendix D of the RD/RA WP). Follow-up inspections will be performed if repairs are required on the rock armor.

5. NEUTRON ACCESS PROBES TUBES

The NPAT will be inspected when sampled or at least annually to ensure that they are operating properly. The tubing will be checked to ensure the end is sealed and free of any dirt. The well casings and well covers will also be inspected. Inspections will include operating condition of the lock, inspection for rust on the cover, and visual inspection of the well casing to ensure it has not been damaged. The guard posts around the well casing will be inspected to ensure they are visible and stable. In the event that any of the components have deteriorated, they will be replaced to remedial design requirements.

6. TIME DOMAIN REFLECTOMETER

The TDR will be inspected when sampled or at least annually to ensure that they are operating properly. The cast iron ring and cover on the concrete weather box will be checked for seal and absence of dirt and debris. The exterior and interior of the box will be checked for deterioration and presence of moisture or water. The solar collector panel will be checked for deterioration and function. The guard posts around the well casing will be inspected to ensure they are visible and stable. In the event that any of these components have deteriorated, they will be replaced to remedial design requirements.

7. INSTITUTIONAL CONTROLS

During regularly scheduled inspections the institutional controls (including CFA Landfill site signs, permanent markers, barriers, fences, and postings) restricting access to the CFA Landfill area to authorized personnel will be inspected and their status documented on the inspection report.

8. ORGANIZATION AND RESPONSIBILITIES

Following is a description of the organization that will perform the O&M activities, as well as the individuals responsible for the inspections, repairs, and reporting required by the O&M Plan.

8.1 Organization

8.1.1 Department of Energy Project Manager

The U.S. Department of Energy, Idaho Operations Office (DOE-ID) Waste Area Group (WAG) 4 project manager is responsible for ensuring the O&M activities are performed in accordance with the approved plan. The WAG 4 project manager will coordinate the activities of the INEEL operating contractor.

8.1.2 INEEL Management and Operating Contractor WAG 4 Remediation Project Manager

The INEEL M&O Contractor WAG 4 remediation project manager will be the point of contact for O&M activities, and will be responsible for document control of inspection reports, data reduction, administration of subcontracts for performing required repairs, and reporting of activities to DOE-ID. The project manager will send inspection reports to document control for placement in the project records file.

8.2 Responsibilities

8.2.1 Inspections

The INEEL M&O Contractor remediation project manager will provide personnel to inspect the CFA Landfill native soil covers in accordance with this O&M Plan. Personnel will be trained to the requirements of the approved plan prior to performing inspections. Inspection documentation will be submitted to the INEEL M&O Contractor WAG 4 remediation project manager for disposition and reporting.

8.2.2 Repair/Replacement of Material

The INEEL M&O Contractor WAG 4 remediation project manager will obtain the services of a subcontractor, as necessary, to repair or replace CFA Landfill native soil cover materials identified on inspection reports as requiring corrective action in accordance with the approved O&M Plan. All repairs will be performed so as to meet construction specifications for material composition, water content, density, and compaction. The remediation project manager will provide construction management support for maintenance activities, and will document all repairs or replacements in accordance with existing INEEL procedures.

8.2.3 Reporting

The INEEL M&O Contractor WAG 4 remediation project manager will report the results of inspection activities and maintenance activities to the DOE-ID WAG 4 project manager as they become available based on this O&M Plan.

9. REPORTING REQUIREMENTS

9.1 Inspection

The inspection results will be recorded on the attached Inspection Form (Attachment 1).

The form will be completed, signed and dated, and submitted to the INEEL M&O Contractor WAG 4 remediation project manager.

9.2 Maintenance

No routine maintenance is planned for the sites. Unscheduled custodial maintenance activities that may be required will be determined during inspections.

The INEEL M&O Contractor WAG 4 remediation project manager will develop the following documents to be submitted to the DOE-ID WAG 4 project manager for required maintenance activities:

- A work plan identifying maintenance activities required, as identified by inspection reports. The work plan will include a technical work scope, cost estimate, schedule, and reference list of existing applicable technical specifications and drawings, and health and safety requirements.
- A completion report identifying the maintenance work performed and including record drawings of maintenance work, if design configuration of the CFA Landfill caps is altered.

9.3 Reporting

The INEEL M&O Contractor WAG 4 remediation project manager's periodic report to DOE-ID WAG 4 project manager will include the inspection reports for the period, a summary of the inspection and maintenance activities, and an estimate of maintenance activities required in the future.

ATTACHMENT 1

INSPECTION REPORT FORMS

AS REQUIRED BY OU 4-12 OPERATING AND MAINTENANCE PLAN

Periodic Inspection of CFA Landfill Native Soil Covers

Inspection at Landfill I ☐ Landfill II ☐ Landfill III ☐

INSPECTION ACTIVITY	INSPECTOR SIGNATURE	INSPECTOR DATE	STATUS		COMMENTS/RECOMMENDED REPAIR
			SAT	UNSAT	
<u>VEGETATIVE COVER</u>					
1. Inspect for nongrowth areas.					
2. Inspect for sparse growth areas.					
3. Inspect for weed encroachment.					
<u>SOIL COVER</u>					
1. Inspect for erosion areas.					
2. Inspect for subsidence areas or slope movement.					
3. Inspect for animal intrusion.					
<u>ROCK ARMOR</u>					
1. Inspect to verify a minimum of 30.5 cm (12 in.) of rock armor.					
<u>TIME DOMAIN REFLECTOMETER</u>					
1. Inspect equipment cabinet to verify it is sealed.					
2. Inspect interior for unusual dirt or debris.					
3. Inspect the exterior and interior of the weather box for deterioration and presence of moisture or water.					
4. Inspect the solar collector barrel for condition/function.					
5. Inspect and verify presence of guard post and TDR.					

SAT = Satisfactory

UNSAT = Unsatisfactory

INSPECTION ACTIVITY	INSPECTOR SIGNATURE	INSPECTOR DATE	STATUS		COMMENTS/RECOMMENDED REPAIR
			SAT	UNSAT	
<u>AQUIFER/SOIL GAS WELLS AND NEUTRON ACCESS PROBES TUBES (NPAT)</u>					
1. Inspect for integrity.					
2. Inspect for cleanliness.					
3. Inspect operating condition of lock, rust on cover, well casing damage.					
4. Inspect guard posts around well cover to ensure they are stable.					
<u>INSTITUTIONAL CONTROLS</u>					
1. Document fences/barriers restrict access.					
2. Document signs/barriers identifying they are in place					

Name of Inspector _____

Photographs: ☐ Taken ☐ Not Taken

Qualification/Title _____

Approved _____

Signature
INEEL M&O Contractor WAG 4 Remediation Program Manager

_____ Date

S.) isfactory
Unsatisfactory